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Performance Oriented Packaging Testing of Mk 43 Mod 0 and Mk 43 Mod 1 Drums for Packing Group II Solid Hazardous Materials

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6. AUTHOR(S)
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13. ABSTRACT (Maximum 200 words)

Qualification tests were performed to determine whether the in-service Mk 43 Mod 0 Drum could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 167.8 kg (370 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register, Vol. 55 on 21 Dec 90. The drum has conformed to the POP performance requirements; i.e., the drum successfully retained its contents throughout the specified tests.

In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 43 Mod 1 Drum as per the variation in the Federal Register (21 Feb 91) and page 52724, para 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Vol. 55.

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DODPOPHM/USA/DOD/NADTR91010

PERFORMANCE ORIENTED PACKAGING TESTING OF DRUMS, MK 43 MOD 0 AND MK 43 MOD 1, FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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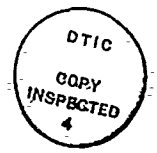

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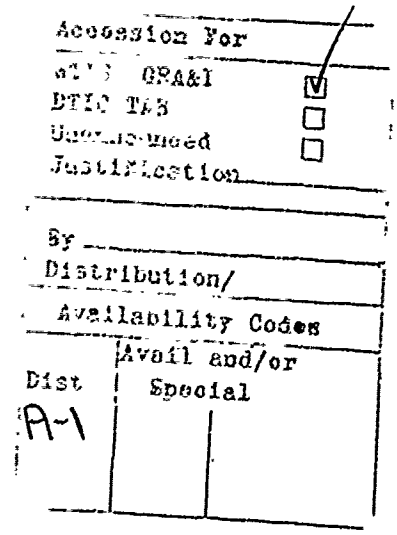

6 August 1991

FINAL

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INTRODUCTION

The Mk 43 Mod 0 Drum tested, contained a simulated load of 317 pounds of sand representing the worst case of loading. Overall weight of the drum was 370 pounds. This Performance Oriented Packaging (POP) test was performed to ascertain whether this standard container (Packing Group II) would meet the requirements as specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the final rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register Volume 55. This vibration test was previously conducted by WPNSTA Earle as documented in Test Report 40-013-90.

The objectives of these tests were to minimize the risk of personnel or environmental exposure to the hazards associated with the contents in the advent of a transportation or handling accident.

In addition, due to their similarities in size and weight, this test is considered representative of qualification testing for the Mk 43 Mod 1 Drum as per the variation in the Federal Register (21 February 1991) and page 52724, paragraph 178.601h of the Final Rulings specified in the Department of Transportation's Performance Oriented Packaging Standards in the Federal Register, Volume 55.

TESTS PERFORMED

1. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.6. Three drums were used for this test. Each drum was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (including the test sample). A weight of 1,110 pounds was stacked on each sample drum. The test was performed for 24 hours. After the allowed time, the weight was removed and the drums examined.

2. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, chapter 9, paragraph 9.7.3. Six drums were used as required. The drops were performed from a height of 1.2 meters (4 feet) in the following orientations (three drums for each orientation):

a. Horizontally.

b. Diagonally on the edge between the cover assembly and the top ring of the drum.

This test was performed at an ambient temperature of +70 ± 20 °F.

PASS/FAIL (UN CRITERIA)

1. Stacking Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "... no test sample should leak. No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages."

2. Drop Test (UN CRITERIA)

The criteria for passing the drop test is outlined in paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle; e.g., a plastic bag, even if the closure is no longer sift-proof. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs."

TEST RESULTS

1. Stacking Test

Satisfactory.

2. Drop Test

Satisfactory.

DISCUSSION

1. Stacking Test

Each drum was visibly checked after the 24-hour period was over. There was no leakage, distortion, or deterioration to any of the drums as a result of this test.

2. Drop Test

After each drop, the containers were inspected for any damage which would be a cause for rejection. The inspection after the horizontal drops indicated there was a 6-inch flat indentation at the point of impact on both the top and bottom rims, but no leakage was found. No leakage was found after the diagonal drops, although two 1-inch raised bulges on the drum's lid were present, 8 inches bilaterally apart from the point of impact. The drums remained intact and functional upon completion of the tests.

REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6

B. Title 49 CFR 107, et al., Performance Oriented Packaging Standard; Changes to Classification, Hazard Communication, Packaging and Handling Requirements Based on UN Standards and Agency Initiative; Final Rule, Federal Register, Vol. 55, No. 246 of December 21, 1990.

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TEST DATA SHEET

DATA SHEET:	
Container: Mk 43 Mod 0 Drum	
Type: 1A2	**Container P/N or NSN:** NSN 1320-01-114-2028
Specification Number: ADL 5166058-A000	**Material:** Steel
Gross Weight: 167.8 kg (370 pounds)	**Dimensions:** 24" H x 24" dia
Closure (Method/Type): Removable Cover	**Empty Weight:** 24.3 kg (53.5 pounds)
Additional Description: Mod 1 Drawing 5166058	
PRODUCT: See table	
Name: See table	**NSN(s):** See table
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A **At 50 °C:** N/A **At 55 °C:** N/A	
Consistency/Viscosity: N/A **Density/Specific Gravity:** N/A	
Amount Per Container: See table **Flash Point:** N/A	
Net Weight: See table	
TEST PRODUCT: Simulated Weights of Sand	
Name: Sand **Physical State:** Solid	
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A **Net Weight:** 143.6 kg (317 pounds)	

TABLE 1

Mk 43 Mods 0, 1 Drum

NALC	NSN	Type	Packing Drawing	UN Code	UN Number	#/ Cntr	Weight (lb)
N/A	1390-01-035-1842	Shipping Container	ADL-5166058	1.2G	0314	1	203

MK 43 MOD 0 AND MK 43 MOD 1 DRUMS

POP MARKING

UN 1A2/Y168/S/**/USA/DOD/NAD

** YEAR LAST PACKED OR MANUFACTURED

Encl (2)